



TEACHERS' PERCEPTIONS OF TECHNOLOGY INTEGRATION AND PEDAGOGY IN KINDERGARTEN TO GRADE 5

Megan A. Bailey¹, Michelle McCraney², Glenn Richard Penny³, *Sunddip Panesar-Aguilar⁴, Chris Cale⁵

¹ EdD, Assistant Principal Fountain Fort Carson School District 8, Fountain

^{2,3} EdD, PhD, Riley College of Education, Walden University, Minneapolis

^{*4} EdD, College of Health Sciences, University of St. Augustine, St. Augustine (Corresponding Author)

⁵ JF School of Psychology and Social Sciences, National University, San Diego

ABSTRACT

At a small, suburban elementary school in the western United States, teachers in kindergarten through fifth grade (Grades K-5) were not consistently implementing technology within instruction. The purpose of this basic qualitative study was to explore the perceptions of Grades K-5 teachers at the elementary school regarding barriers and challenges of technology integration within classroom instruction. The study's conceptual framework consisted of Mishra and Koehler's technological pedagogical content knowledge (TPACK) framework and Bandura's conceptualization of self-efficacy. The research questions concerned the perceptions of teachers who teach within a 1:1 classroom where there is one device for every student, regarding their ability to consistently integrate technology within classroom instruction and what pedagogical practices they perceive as necessary to do so. Purposeful sampling was employed in the selection process, and to accomplish this, inclusion criteria were used to select participants. Interviews and sentence completion were then used to gather data from the 11 participants. Participants' responses were coded and categorized into themes. The results found that participants believed formal training and collaboration would give them the skills and knowledge necessary to integrate technology into their classroom instruction. The study may promote positive social change in districts by influencing professional development (PD) practices to support technology-integrated instruction. Teachers will be better able to integrate technology into instruction continuously, and school administration will be able to provide better ongoing support, which will better prepare students for the 21st century.

KEYWORDS: Technology in Education, Classroom Instruction, Technology, Elementary School Instruction, Teacher Training.

INTRODUCTION

Technology integration within classroom instruction is a new concept for teachers and students. Expectations of what students should know and do and what instructional learning experiences teachers should provide have changed. Technology has been increasingly crucial to and focuses on classroom instruction¹. However, there were barriers to technology integration at a small, suburban elementary school in the western United States. Specifically, the problem was that teachers in Grades K-5 were not implementing technology within instruction consistently at the study site. This issue affected the elementary school under study because developing consistent and effective pedagogical practices when integrating technology into K-5 classroom instruction is vital to a systematic approach to instruction¹.

Leaders at the elementary school under study acknowledged that teachers' pedagogical practices should be effective for all students, reflected in the data from year to year. They indicated that teachers should use the adopted program resources, specifically the online components, in classroom instruction. Success would be when students are engaged in higher-level rigorous learning in all subjects that reflect their grade-level expectations. However, the principal of the elementary school under study described teachers' attitudes as angst-ridden about the implementation of technology within instruction, stating that "teachers have expressed anxiety over using technology within their instruction and do not feel confident in its implementation." Data from the Colorado State Model Performance Management System² showed inconsistencies in how students at the study site used technology programs or software for learning and teachers for classroom instruction.

Despite having comparable technology equipment, access to district PD, and similar digital curriculum resources, teachers faced challenges using technology for classroom instruction. Further evidence of the problem across Grades K-5 was communicated in the meeting minutes for grade-level professional learning communities (PLCs). According to the principal, during PLC meetings, teachers had expressed that they "do not know how to use technology within their instruction and that they would rather leave the computers charging than try to mess with them." The principal added that teachers at the school had indicated that their students were "too young, not developmentally ready, or would just play." Teachers were not using technology consistently within the classroom despite having the technology accessible within their classrooms.

Problem

For teachers in kindergarten through fifth grade (Grades K-5) classrooms, better preparing students with 21st-century skills is a crucial aim. Their expectations change as technology advances, increasing the need to understand their perceptions of technology's role in teaching. According to O'Neal et al.³, integrating technology within the curriculum aids in developing the skills

necessary for success in the modern world. Still, the purpose of technology in 21st-century teaching has yet to be identified in Grades K-5. Common Sense Media⁴ conducted research indicating that approximately one third of U.S. teachers provided technology products by either their school or district did not regularly use the technology. Further substantiating the need for more investigation of barriers to teachers' use of technology, most teachers perceive digital technologies as helpful to students' education⁵. They face a challenge, though, in using technology to create a learner-centered classroom. Teachers are not necessarily provided with the correct professional development (PD) and technological tools to integrate technology consistently and effectively within their classrooms.

Although most Grades K-5 educators agree that technology is vital in teaching, they struggle to integrate technology across the curriculum consistently. Technology integration continues to be a separate activity from instruction, and in classrooms, technology is provided as an independent activity or used as an incentive or reward⁶. Furthermore, the literature reveals that technology is not being integrated into pedagogy and is used for necessary activities such as displaying information to students⁷. The implementation of technology within instruction requires PD. Despite rapid technological advancements, teachers have been slow to adopt technologies due to a lack of technological resources and PD. Technological pedagogical content knowledge (TPACK) is a conceptual framework for integrating technology within classroom instruction. A study conducted by Zipke⁸ indicated an absence of pedagogical knowledge (PK) on how best to implement technology within education. The study found that many teachers can use devices, otherwise known as technical knowledge (TK). However, due to a lack of PD, many teachers do not have technological content knowledge (TCK) to understand how technology can change the content area taught and how to build technological pedagogical knowledge (TPK) and integrate technology into instruction within their pedagogical practices.

A large body of literature indicates that a substantial gap exists between conceptual understanding and the application of technology within classroom instruction. Regen et al.⁹ found that U.S. teachers face barriers to consistently integrating technology within instruction, which includes a lack of constant access to technology and being afforded little to no appropriate PD, leading to teachers questioning the value of technology. The use of technology within instruction has the potential to have social implications since it has the capacity to operate as a window outside the four walls of the traditional K-5 classroom.

Purpose

The purpose of this basic qualitative study was to explore the perceptions of 11 teachers in Grades K-5 at the elementary school to understand better why they did not consistently integrate technology within instruction. The research questions (RQs) were designed to explore the perceptions of teachers who teach

within a 1:1 classroom:

RQ1: What pedagogical practices do teachers perceive as necessary to integrate technology consistently within classroom instruction?

RQ2: How do teachers perceive their ability to integrate technology consistently within classroom instruction?

MATERIALS AND METHODS

Two different data collection methods were employed in this study's qualitative research: open-ended sentence stems and semistructured individual interviews. Using open-ended sentence stems as a data collection method inspired honest, insightful responses⁸ and was found to generate participants' ideas about specific educational topics and explore participants' social attitudes towards the topic⁹. This elicitation technique was used to concentrate participants' responses and encourage honesty and insight into individuals' perceptions regarding technology integration and pedagogy in K-5 classrooms.

Although data collection can occur in many ways, the purpose of this study justified the use of semistructured interviews to provide insight into multiple perceptions. Open-ended sentence stems provided honest dialogue into actual perceptions held by participants. The use of open-ended sentence stems gave the emergence of themes relating to teachers' perceptions regarding technology integration and pedagogy within K-5 education.

Participants and Sampling. General education teachers in Grades K-5 were appropriate participants for this study because they provided instruction within all academic content areas and in a 1:1 classroom with a device for each student. Purposeful sampling was used to select participants. Purposeful sampling allows a researcher to choose participants with the correct attributes to answer the RQs appropriately. This involved identifying and selecting participants who were particularly familiar with or trained with the topic being studied¹⁰.

Participants for this study came from the elementary school under study. Within each grade level K-5 at the study site, there are four to five general education teachers. Special education and related arts teachers were excluded from this study because they did not have their classrooms and because they saw multiple grade levels throughout the day. Their classrooms or classroom settings were not equipped to be a 1:1 learning environment. Additionally, only teachers fully employed by the school district were invited to participate in the study. Employment information was obtained from the administration team at the school under study.

Eleven participants participated in interviews for the study and provided adequate saturation.

Instrument

Collection instruments included an interview protocol and a set of elicitation stems consisting of open-ended sentence questions. Data was collected while recording the interviews with video via the Zoom meeting platform. Each participant interview session was recorded using the Zoom meeting platform and downloaded the Zoom video file. Google Docs: Voice Typing was used to transcribe the session audio file.

The data collection instruments were chosen as they were applicable to complete an in-depth analysis of this study's basic qualitative design. The data collection instruments used in the research empowered participants to share their perceptions of technology integration and pedagogy in K-5 education.

Data Collection

Due to the COVID-19 pandemic and district safety protocols, the interviews were conducted remotely using video recording via a secure password-protected meeting room using the Zoom meeting platform, thus maintaining participant confidentiality. Although it was vital to provide a convenient and appropriate interview setting, there was no other choice in the interview setting due to the continuing safety concerns surrounding the COVID-19 pandemic and for the foreseeable future. Initial data collection occurred during 45 min to 1-hour individual semistructured interviews with a purposeful sample of 11 general education teachers from the elementary school under study. Semistructured interviews allowed me to use interview questions to guide the interview through open-ended questions. Using open-ended questioning enabled participants to narrate experiences or share perceptions but in relation to the research topic¹¹.

The interview protocol and use of open-ended sentence stems as an elicitation technique provided sufficiency as data collection instruments. The RQs designed for the study addressed the teachers' perceptions regarding technology integration and pedagogy in K-5 education. The use of both interview questions and open-ended sentence stems encouraged dialogue, sincerity, and insight into individuals' perceptions. Member checking was established, and participants were invited to respond to the data collected in qualitative interviews. Participants were asked to respond to preliminary findings individually via a Zoom video session, thus creating a dialogue between the participant and myself¹². Table 1 shows the alignment of the RQs to the interview questions.

Research question	Interview question
RQ1: What pedagogical practices do teachers perceive as necessary to integrate technology consistently within classroom instruction?	<ol style="list-style-type: none"> 1. How do you normally teach? What type of instructional approach do you take within your daily instruction. 2. What types of engagement strategies do you currently use within classroom instruction? 3. How do you create collaboration between students in your classroom? 4. How does your teaching change based on the subject you are teaching? 5. How do you currently use technology within classroom instruction? 6. What do you want students to be able to learn by using technology within instruction? 7. What does technology integration mean to you? 8. How do you plan for technology integration within elementary for the primary or intermediate classroom? 9. What is your reason to use technology within classroom instruction? 10. What do you do you feel is necessary for you to successfully use technology consistently within classroom instruction?
RQ2: How do teachers perceive their ability to integrate technology consistently within classroom instruction?	<ol style="list-style-type: none"> 11. What kind of technology integration strategies have you learned at school and/or have you learned any technology integration strategies from outside PDs? 12. What do you perceive as barriers or challenges to integrating technology within instruction? 13. What are some barriers to teaching with technology in the elementary classroom? 14. Do you see advantages for technology integration in the elementary classroom? 15. How do you feel about planning lessons with technology? 16. How is the use of technology within instruction pre-planned? 17. What feelings do you have or have you about your ability to integrate technology within classroom instruction? 18. How is technology used in 1:1 activities? 19. What are the pedagogy needed to complete a technology activity? 20. How has your ability to integrate technology consistently within classroom instruction changed due to the COVID-19 pandemic?

Table 1: Alignment of Research Questions to Interview Questions

The use of open-ended sentence stems encouraged participants to speak candidly about their genuine perceptions and led to themes forming. For each RQ, open-ended sentence stems were generated. The alignment of RQs with open-ended sentence stems is presented in Table 2.

Research question	Open-ended sentence stem
RQ1: What pedagogical practices do teachers perceive as necessary to integrate technology consistently within classroom instruction?	<ol style="list-style-type: none"> 1. Instructional strategies I use within my classroom are... 2. The learning environment within my classroom can be described as... 3. I would describe integrating technology within classroom instruction as... 4. I use technology in my classroom when...
RQ2: How do teachers perceive their ability to integrate technology consistently within classroom instruction?	<ol style="list-style-type: none"> 5. My ability to integrate technology within classroom instruction consistently is... 6. I feel successful when... 7. I feel unsuccessful when... 8. A barrier to using technology consistently within classroom instruction is... 9. The effect that the COVID-19 pandemic has had on my ability to use technology consistently within classroom instruction is...

Table 2: Alignment of Research Questions to Open-Ended Sentence Stems

RESULTS

Research Question 1. RQ1 addressed the pedagogical practices teachers perceived as necessary to integrate technology consistently within classroom instruction. There were five themes established to answer this question. This section was organized based on the five identified themes. Figure 1 illustrates the link between RQ1 and the five themes that emerged.

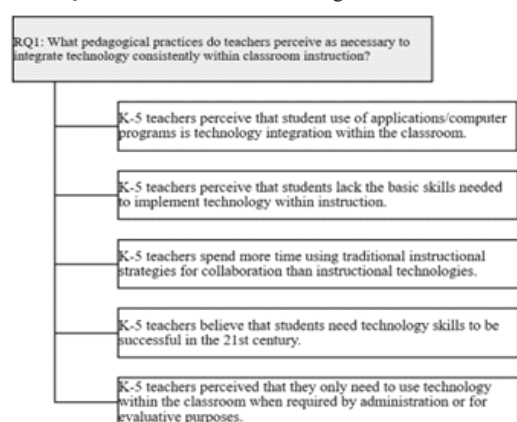


Figure 1: Themes Related to Research Question 1

Research Question 2. RQ2 addressed how teachers perceived their ability to integrate technology consistently within classroom instruction. There were four themes and two subthemes established to answer this question. This section was organized based on the four identified themes and two subthemes. Figure 2 illustrates the link between RQ2 and the four new themes and two subthemes that emerged.

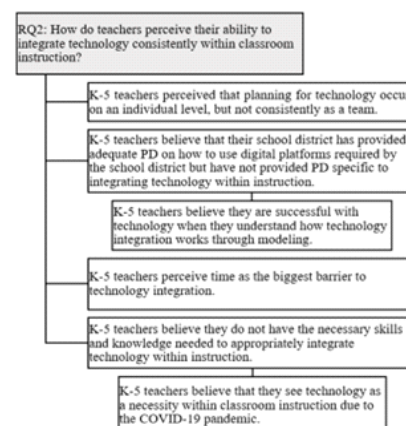


Figure 2: Themes and Subthemes Related to Research Question 2

DISCUSSION

Every participant discussed their obstacles while attempting to implement technology into instruction. However, most participants reported that despite the difficulties, they would have an open mind and were interested in integrating technology appropriately and successfully into their daily instruction. Every one of the participants expressed a wish to acquire additional training to improve their ability to integrate technology into their lessons. Through the analysis of the data collected in my study, nine key themes and two subthemes emerged regarding teachers' perspectives and experiences with each RQ emerged.

In summary, the themes that were generated to provide support for RQ1 and RQ2 helped in better comprehending the perceptions of teachers in connection to the obstacles that are involved with continuously incorporating technology into instruction. In addition to providing invaluable insights regarding PD opportunities and what areas of opportunity there are to build teacher capacity and stakeholder knowledge, the participants' responses provided the information necessary to develop intentional PD at the study site. This allowed for an in-depth understanding of the challenges that the participants perceived. According to the findings, PD should include introductory, intermediate, and advanced levels of training, all of which should be completed through ongoing training embedded within the Professional Learning Community structure. In addition, there should be a deliberate follow-up to assist in the integration of technology into the instructional process.

Recommendations for Future Practice:

Access to PD opportunities of high quality is essential for the ongoing growth and development of teachers at the study site in Grades K-5. The integration of educational technology into classrooms enables both students and instructors to gain access to a variety of learning tools that help students get ready for the 21st century. Educators must be active members of professional communities that encourage the growth of leadership skills and give them the ability to affect change using 1:1 technology. One-to-one educators need to practice and improve their technical skills to engage in discussions about 1:1 technology in their schools, according to Parrish and Sadara (2020). Teachers' PD should include opportunities to focus on their pedagogical practices when integrating technology.

The results of this study indicated that the study site occasionally offers technology-based PD opportunities. Despite this, there is a gap in the present PD programs, and there are chances to fulfill the learning needs of teachers regarding instructional technologies and ongoing job-integrated assistance. The findings of this study also underlined the necessity to implement differentiated learning in PD offered to teachers in accordance with the specific needs and level of technology understanding of teachers. The findings made it evident that future research should concentrate on instructional technology and the essential PD preparations for training to enhance teacher capacity and the differentiation of PD for the various learning levels of K-5 teachers at the study site.

CONCLUSIONS

The purpose of this basic qualitative study was to explore the teachers' perceptions of integrating technology consistently within classroom instruction in Grades K-5 at the elementary school under study to understand why technology was not being implemented within instruction consistently. The problem was researched to determine teachers' perceptions of the pedagogical practices they consider necessary for consistently integrating technology within instruction and teachers' perceptions of their ability to integrate technology

within instruction consistently. Participants were given the opportunity to expound in Section 2 on why they do not believe they can integrate technology into instruction consistently. The causes for this were a lack of preparation with grade-level teams, training, collaboration amongst peers, support, and time available to test and plan technology within lessons. The participants believed that formal training combined with opportunities for collaboration would provide the skills and knowledge they required to be more successful at integrating technology throughout their classroom consistently.

Effective use of technology in instruction requires altering pedagogical techniques and overcoming hurdles to integration. Every participant in the study acknowledged the challenges of integrating technology into instruction. Despite the challenges, most participants were willing to retain an open mind and learn how to integrate technology into their daily training, and every participant wanted further technology integration training. Developing and providing a rigorous PD program would give teachers the confidence and abilities to integrate technology into the classroom consistently.

In summary, PD was deemed the greatest solution to the lack of consistent technology use in K-5 instruction at the study site. This was determined because PD matched the needs of the teachers in relation to the RQs. The PD was designed directly as a response to the study's findings on why teachers do not routinely use technology in the classroom. Participating in PD events improves each participant's practice and the school's performance.

REFERENCES

1. Hutchison, A. C., & Woodward, L. (2018). Examining the technology integration planning cycle model of professional development to support teachers' instructional practices. *Teachers College Record*, 120(10). https://www.academia.edu/37321973/Examining_the_technology_integration_planning_cycle_model_of_professional_development_to_support_teachers_instructional_practices
2. Colorado State Model Performance Management System. (2021). Colorado Department of Education Home Page. CDE. <https://www.cde.state.co.us/>
3. O'Neal, L. J., Gibson, P., Cotton, S.R. (2017). Elementary school teachers' beliefs about the role of technology in 21st-century teaching and learning. *Computers in the Schools*, 34(3), 192–206. <https://doi.org/10.1080/07380569.2017.1347443>
4. Common Sense Media (2019). The Common-sense census: Inside the 21st-century classroom. <https://www.commonsensemedia.org/sites/default/files/research/report/2019-educator-census-inside-the-21st-century-classroom-key-findings.pdf>
5. Mouza, C. (2019). Beliefs, models, and practices on fostering teacher learning in technology integration. *Contemporary Issues in Technology and Teacher Education*, 19(3), 302–304.
6. Zipke, M. (2018). Preparing teachers to teach technology: Examining the effectiveness of a course in educational technology. *The New Educator*, 14(4), 342–362. <https://doi.org/10.1080/1547688X.2017.1401191>
7. Regan, K., Evmenova, A. S., MacVittie, N. P., Leggett, A., Ives, S., Schwartz, J., Mastropieri, M., & Rybicki-Newman, M. P. (2019). A case study of early adopters of technology in a social studies classroom. *Contemporary Issues in Technology and Teacher Education*, 19(3), 439–468.
8. Howell, L. L., Lewis, C. W., & Watkins Johnson, J. (2012). Computer-assisted instruction: Teachers' perceptions of using study hall 101. *Ubiquitous Learning: An International Journal*, 5(4), 1–17.
9. Barton, E. A., & Dexter, S. (2019). Sources of teachers' self-efficacy for technology integration from formal, informal, and independent professional learning. *Education Tech Research Development*, 68, Article 2377. <https://doi.org/10.1007/s11423-019-09671-6>
10. Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research *Administrative Policy Mental Health*, 533–544.
11. Johnson, J. (2017). Comparing the major definitions of mathematics pedagogical content knowledge. *Journal of Mathematics Education at Teachers College*, 8(1), 19–28. <https://doaj.org/article/bd495c04abee440c98df70a244d0836a>
12. Lewthwaite, S., & Nind, M. (2016) Teaching research methods in the social sciences: Expert perspectives on pedagogy and practice. *British Journal of Educational Studies*, 64(4), 413–430. <https://doi.org/10.1080/00071005.2016.1197882>